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(54) **CONTAINER PRE-CUTTING SYSTEM**

(57) This invention relates to a container pre-cutting system, applicable to multilayer and/or single-layer (3) container forming machines (4) that provide intermittent advances to the multi-layer and/or single-layer material with a length according to an advance step of the machine; said system being suitable for making a lower pre-cut (32) on the lower surface and an upper pre-cut (32) on the upper surface of the multilayer and/or single-layer material (3). The system comprises a lower pre-cutting device (1) and an upper pre-cutting device (2), provided with respective lower (11) and upper (21) blades having relative vertical movement with respect to the multilayer and/or single-layer material (3); and wherein the lower pre-cutting device (1) and the upper pre-cutting device (2) are separated in the advance direction of the multilayer and/or single-layer material (3) at a length approximately equal to a multiple of the advance step of the machine.

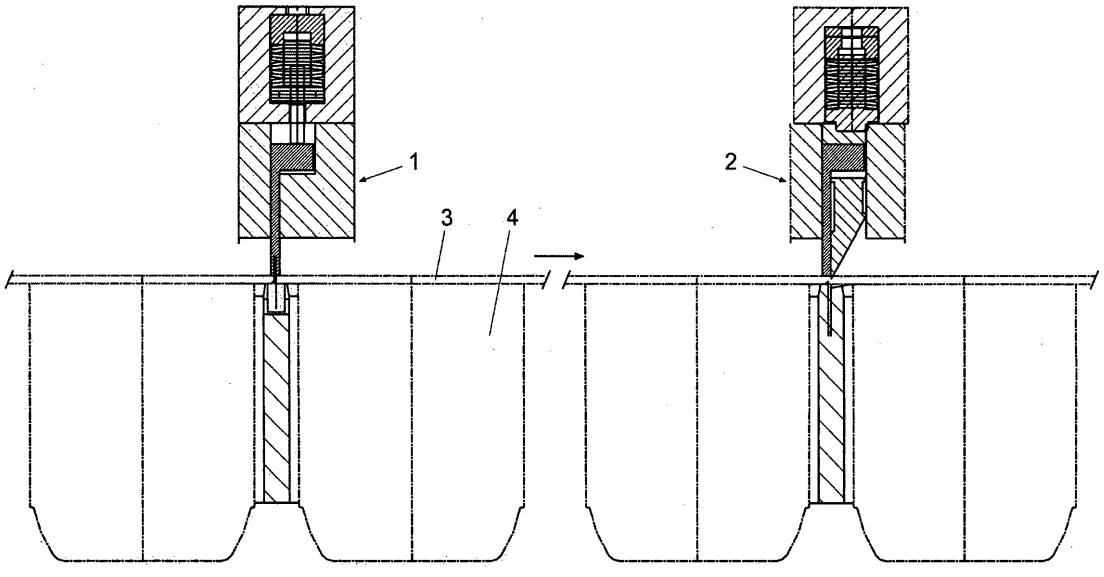

Fig. 1

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Description

Technical field

[0001] This invention is applicable to multilayer and/or single-layer container forming machines, mainly intended for packaging food products, and provides intermittent advances to the multi-layer and/or single-layer material with a length according to the advance step of the machine; the system carrying out a pre-cut on the lower surface and a pre-cut on the upper surface of the multilayer and/or single-layer container material in order to subsequently facilitate the separation of the containers of a single pack.

Background art

[0002] When manufacturing containers made of multilayer material, in particular container packs for the food industry, it is common to make pre-cutting lines on the contours of the containers that affect a part of the thickness of the multilayer material and the aim of which is to facilitate the subsequent manual tearing and separation of the pack containers by the end consumer.

[0003] In containers made with single-layer or bilayer plastic material, making the pre-cutting line on the upper surface of the material is sufficient to allow for the subsequent tearing and separation of the containers of the pack by the user.

[0004] When multilayer materials are used, this upper pre-cutting line is insufficient for guaranteeing a proper separation of the containers of the pack without producing defects in the area of the tear.

[0005] To prevent said drawbacks, in national patent application P201830445, by the same holder as the present invention, a solution was developed that consists of a container pre-cutting device that comprises: a punch plate provided with upper blades to make the upper pre-cutting line, and a die plate that comprises lower blades facing the upper blades, so that when the punch plate closes on the die plate, the upper blades and the lower blades simultaneously define upper and lower pre-cutting lines on opposite faces of the multilayer material of the containers, thereby guaranteeing a proper tear of the multilayer material along said pre-cutting lines.

[0006] This solution is effective for making the upper and lower pre-cuts at the same time; however, depending on the mechanical characteristics of the materials that make up the different layers of the multilayer material, this simultaneity of the upper and lower pre-cuts, which are very close to one another, can cause stress in the multilayer material, by which neither the upper nor the lower pre-cuts are cut, leading to undesirable tears of the multilayer material in said area, either prior to or during the separation of the containers.

Description of the invention

[0007] The container pre-cutting system of this invention is applicable to multilayer and/or single-layer container forming machines, which cause intermittent advances in the multilayer and/or monolayer material with a length according to an advance step of the machine; and has suitable technical features for making a lower pre-cut and an upper pre-cut in the facing areas of the lower and upper surfaces in two phases, meaning successively, not simultaneously, making both the lower and upper pre-cuts in an advance of the multilayer and/or single-layer material of a predetermined length, thereby eliminating the stresses produced in the multilayer and/or single-layer material by making the simultaneous upper and lower pre-cuts.

[0008] Therefore, this system is especially ideal for pre-cutting multipack containers made of different materials (PET, PP, PLA and PS).

[0009] To this end, and according to the invention, this container pre-cutting system comprises a lower pre-cutting device and an upper pre-cutting device, provided with respective lower and upper blades, having relative vertical movement with respect to the multilayer and/or single-layer material; and wherein said lower and upper pre-cutting devices are separated in the advance direction of the multilayer and/or single-layer material by a length equal to a multiple of the advance step of the container forming machine.

[0010] This movement of the multilayer and/or single-layer material between the lower and upper pre-cutting devices makes it so between the upper and lower pre-cuts, the multilayer and/or single-layer material releases the stress produced during the first pre-cut, preventing the stresses from accumulating during the second pre-cut that is very close to the prior pre-cut.

[0011] According to the invention, the lower pre-cutting device comprises: a vertically movable lower die, holding the lower blade; and an upper floating stop, mounted on calibrated springs on a punch plate and against which the multilayer and/or single-layer material is moved by the lower die, during the lower pre-cutting of said multilayer and/or single-layer material.

[0012] Furthermore, the upper pre-cutting device comprises: a lower die and an upper blade mounted with the possibility of relative vertical movement with respect to a floating stop in turn provided with limited vertical movement with respect to a punch plate; said upper blade being mounted on calibrated springs.

[0013] According to one embodiment of the invention the upper and lower pre-cutting devices are defined in a double tool able to be actuated by the same press of the forming machine, which can be a current form, fill and seal machine, for example, also known as FFS machines.

[0014] Optionally, the upper and lower pre-cutting devices are defined on independent tools, installed on different presses.

[0015] In both cases the upper and lower pre-cutting devices are separated from one another by a length corresponding to several advance steps of the machine.

[0016] Lastly, it is worth mentioning that the order of the upper and lower pre-cutting devices in relation to the advance direction of the multilayer and/or single-layer material is not important, the system being able to first make the lower pre-cut and then the upper pre-cut, or vice versa, given that it does not affect the essence of the invention.

Brief description of the content of the drawings

[0017] As a complement to the description being made, and for the purpose of helping to make the features of the invention more readily understandable, this specification is accompanied by a set of drawings which, by way of illustration and not limitation, represent the following.

- Figure 1 shows a schematic elevation view of an exemplary embodiment of the container pre-cutting system according to the invention, wherein the lower pre-cutting device and the upper pre-cutting device can be seen longitudinally separated in the advance direction of containers formed in a sheet of multilayer and/or single-layer material.
- Figure 2 shows an elevation view of the lower pre-cutting device, wherein the lower blade is fixed to the lower die; and a detailed enlargement of the pre-cutting area of the same.
- Figure 3 shows a detailed enlargement of an embodiment variant of the lower pre-cutting device, wherein the lower blade is machined in the lower die itself.
- Figure 4 shows an elevation view of the upper pre-cutting device and a detailed enlargement of the pre-cutting area of the same.
- Figures 5, 6 and 7 schematically show different mounting embodiments of the upper and lower pre-cutting devices with respect to a form, fill and seal machine (FFS machine).

Detailed description of embodiments of the invention

[0018] In figure 1 the container pre-cutting system comprises a lower pre-cutting device (1) and an upper pre-cutting device (2) intended to be mounted on a container forming machine (4), made with multilayer and/or single-layer material (3) and which, when actuated, make both pre-cuts in the lower surface and in the upper surface of the multilayer material (3).

[0019] It must be mentioned that in the aforementioned figure 1, the lower pre-cutting device (1) and the upper pre-cutting device (2) are in this order in the advance direction of the multilayer and/or single-layer material (3), although it could be in the opposite order, since the order does not affect the operation of the system.

[0020] The lower pre-cut device (1) and upper pre-cut device (2) are longitudinally separated in the advance direction of the multilayer material (3) by a length equal to a multiple of the advance step of the container forming machine, such that the lower and upper pre-cutting lines corresponding to the same area of multilayer and/or single-layer material (3) are not made simultaneously, but rather in two successive phases.

[0021] In the exemplary embodiment shown in figure 2, the lower pre-cutting device (1) comprises: a lower die (10), able to move vertically, to which a lower blade (11) is fixed; and an upper floating stop (12) mounted on calibrated springs (13) on a punch plate (14).

[0022] When the lower die (10) moves towards the upper area, as shown in figure 2, it pushes the multilayer material (3) against the upper floating stop (12), the lower blade (11) making a lower pre-cut (31) in the multilayer and/or single-layer material (3).

[0023] It is worth mentioning that the lower blade (11) can be fixed to the lower die (10) as shown in figure 2, or be directly machined on said lower die (10) as shown in the detail of figure 3.

[0024] To make a pre-cut facing the aforementioned lower pre-cut (31) in the upper surface of the multilayer and/or single-layer material (3), it is necessary for the multilayer and/or single-layer material to move a specific number of advance steps of the machine, until said area reaches the upper pre-cutting device (2).

[0025] The upper pre-cutting device (2) shown in figure 4 comprises: a lower die (20) and an upper blade (21) mounted with the possibility of relative vertical movement with respect to a floating stop (22) in turn provided with limited vertical movement with respect to a punch plate (23); said upper blade (20) being mounted on calibrated springs (24).

[0026] When the upper pre-cutting device (2) is actuated, the floating stop (22) presses the multilayer and/or single-layer material (3) against the lower die (20) and the upper blade (21) penetrates the upper surface of the multilayer material (3), defining the upper pre-cut (32) in the same.

[0027] As can be seen in the detailed enlargement of figure 4, the lower pre-cut (31) and the upper pre-cut (32) are slightly separated in the advance direction of the multilayer material (3), the lower die (20) in the area facing the upper blade (21) having a recess (25) that allows for a certain elastic deformation of the multilayer sheet (3) when making the upper pre-cut (32), which contributes to reducing the stresses of the material in the pre-cutting area.

[0028] The lower pre-cutting device (1) and the upper pre-cutting device (2) can be defined in a double tool (51) able to be actuated by the same press of the forming machine (5), as schematically shown in figure 5; or in two independent tools (52, 53) installed on different presses, situated either in the forming machine (5), as shown in figure 6, or one in the forming machine and another out-

side the same, as shown in figure 7.

[0029] In any case, the separation between the lower pre-cutting device (1) and the upper pre-cutting device (2) is a multiple of the advance step of the forming machine (5) so that the lower pre-cut (31) and the upper pre-cut (32) are in facing positions, as shown in figure 4.

[0030] Having sufficiently described the nature of the invention, in addition to an example of preferred embodiment, it is hereby stated for the relevant purposes that the materials, shape, size and layout of the described elements may be modified, provided that it does not imply altering the essential characteristics of the invention claimed below.

Claims

1. A container pre-cutting system, applicable to multilayer and/or single-layer material (3) container forming machines (4) that use intermittent advances of multilayer and/or single-layer material of a length according to an advance step of the machine; said system being suitable for making a lower pre-cut (32) on the lower surface and an upper pre-cut (32) on the upper surface of multilayer and/or single-layer material (3), **characterized in that** it comprises a lower pre-cutting device (1) and an upper pre-cutting device (2), provided with respective lower blades (11) and upper blades (21) having relative vertical movement with respect to the multilayer and/or single-layer material (3); and wherein said lower pre-cutting device (1) and upper pre-cutting device (2) are separated in the advance direction of the multilayer and/or single-layer material (3) by a length that is approximately equal to a multiple of the advance step of the machine.

2. The system according to claim 1, **characterized in that** the lower pre-cutting device (1) comprises: a vertically movable lower die (10), to which the lower blade (11) is fixed, or defined; and an upper floating stop (12), mounted on springs calibrated (13) on a punch plate (14) and against which the multilayer and/or single-layer material (3) is moved by the lower die (10), during the lower pre-cutting of said multilayer material (3).

3. The system according to claim 1, **characterized in that** the upper pre-cutting device (2) comprises: a lower die (20) and an upper blade (21) mounted with the possibility of relative vertical movement with respect to a floating stop (22) in turn provided with limited vertical movement with respect to a punch plate (23); said upper blade (21) being mounted on calibrated springs (24).

4. The system according to any one of claims 1 to 3, **characterized in that** the lower pre-cutting device (1) and the upper pre-cutting device (2) are defined on a double tool (51) able to be actuated by the same press of the container forming machine (5).

5. The system according to any one of claims 1 to 3, **characterized in that** the lower pre-cutting device (1) and the upper pre-cutting device (2) are defined on independent tools (52, 53), installed on different presses and separated from one another by a multiple length of the advance step of the forming machine (5).

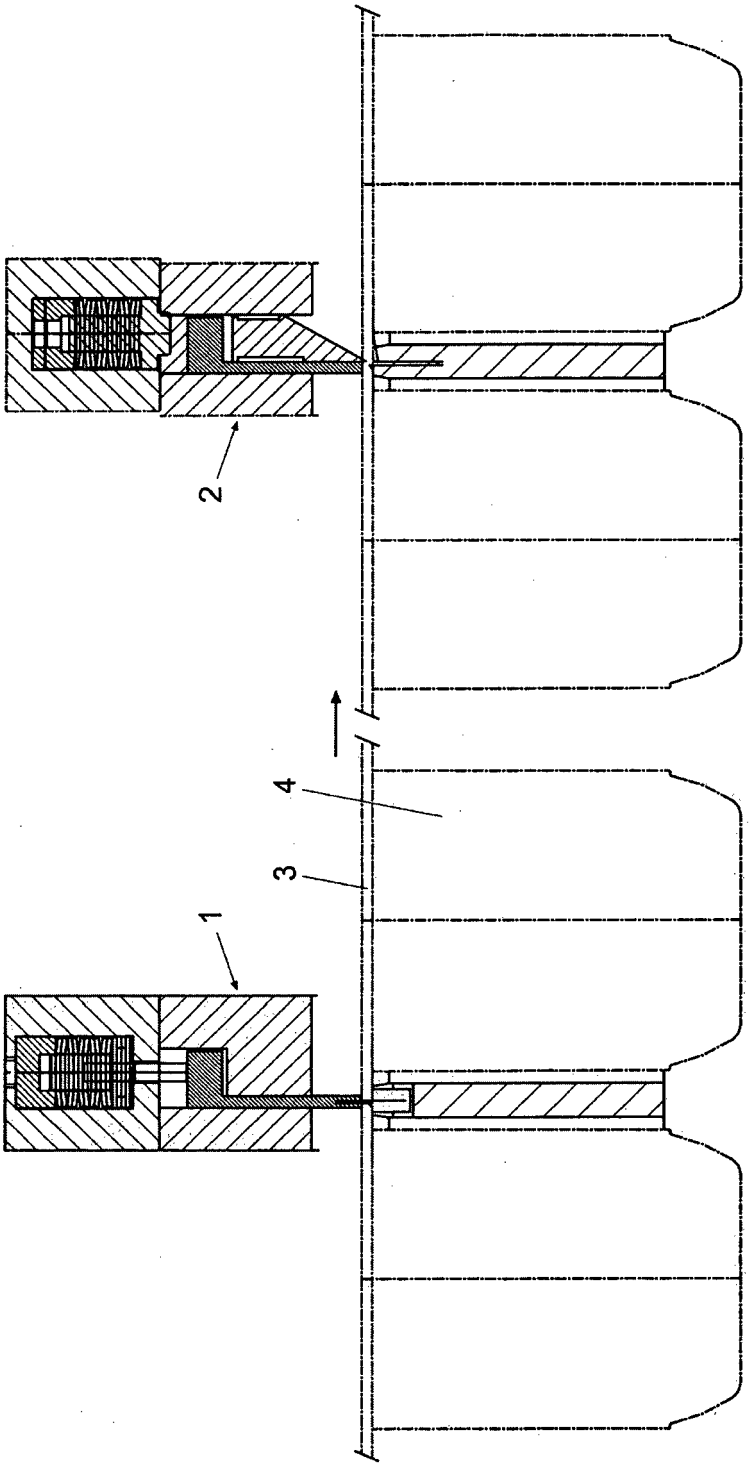

Fig. 1

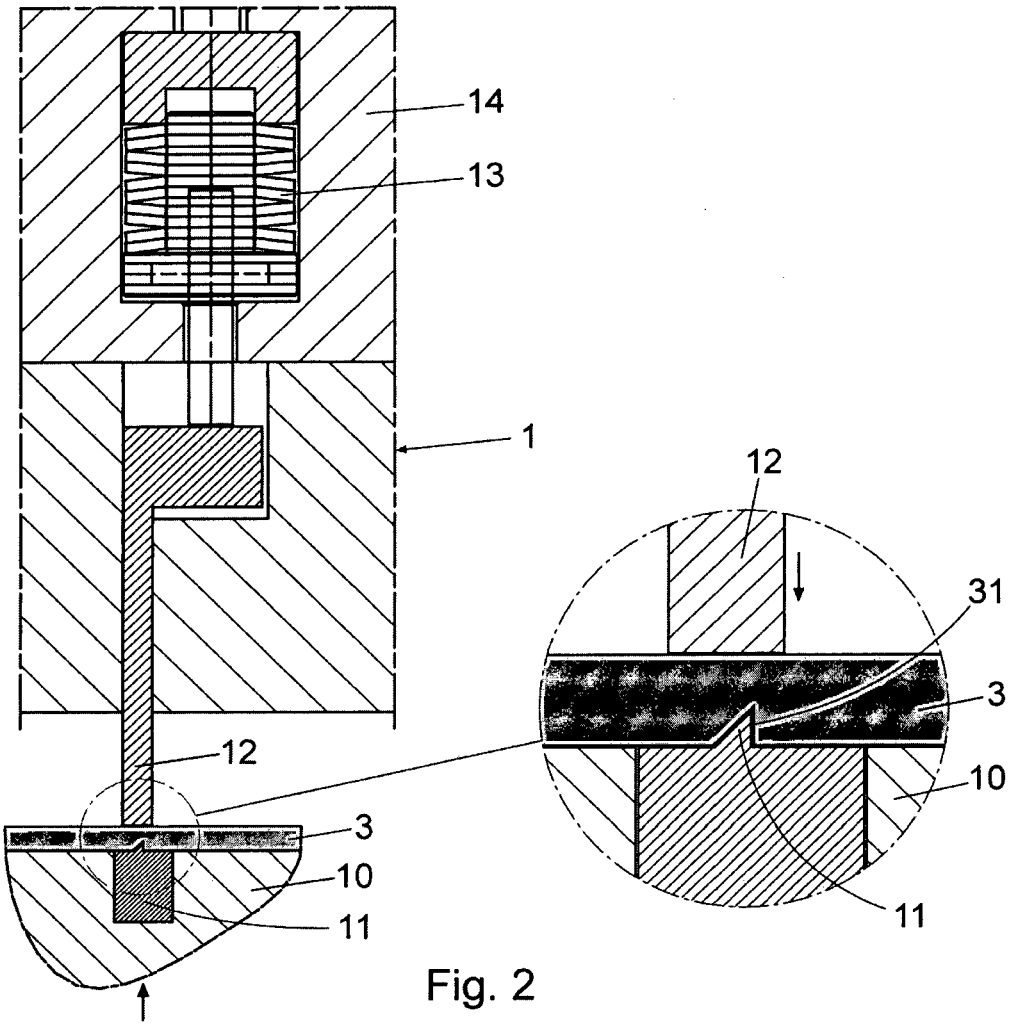

Fig. 2

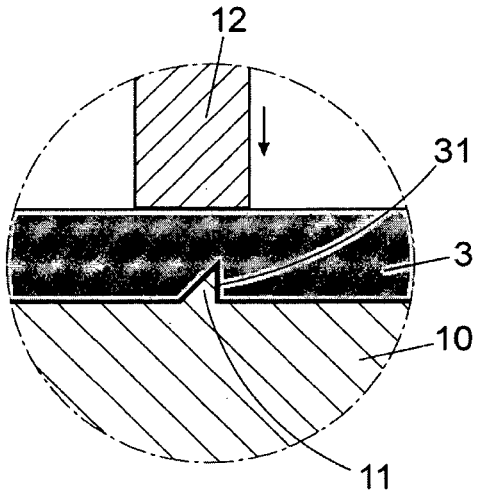

Fig. 3

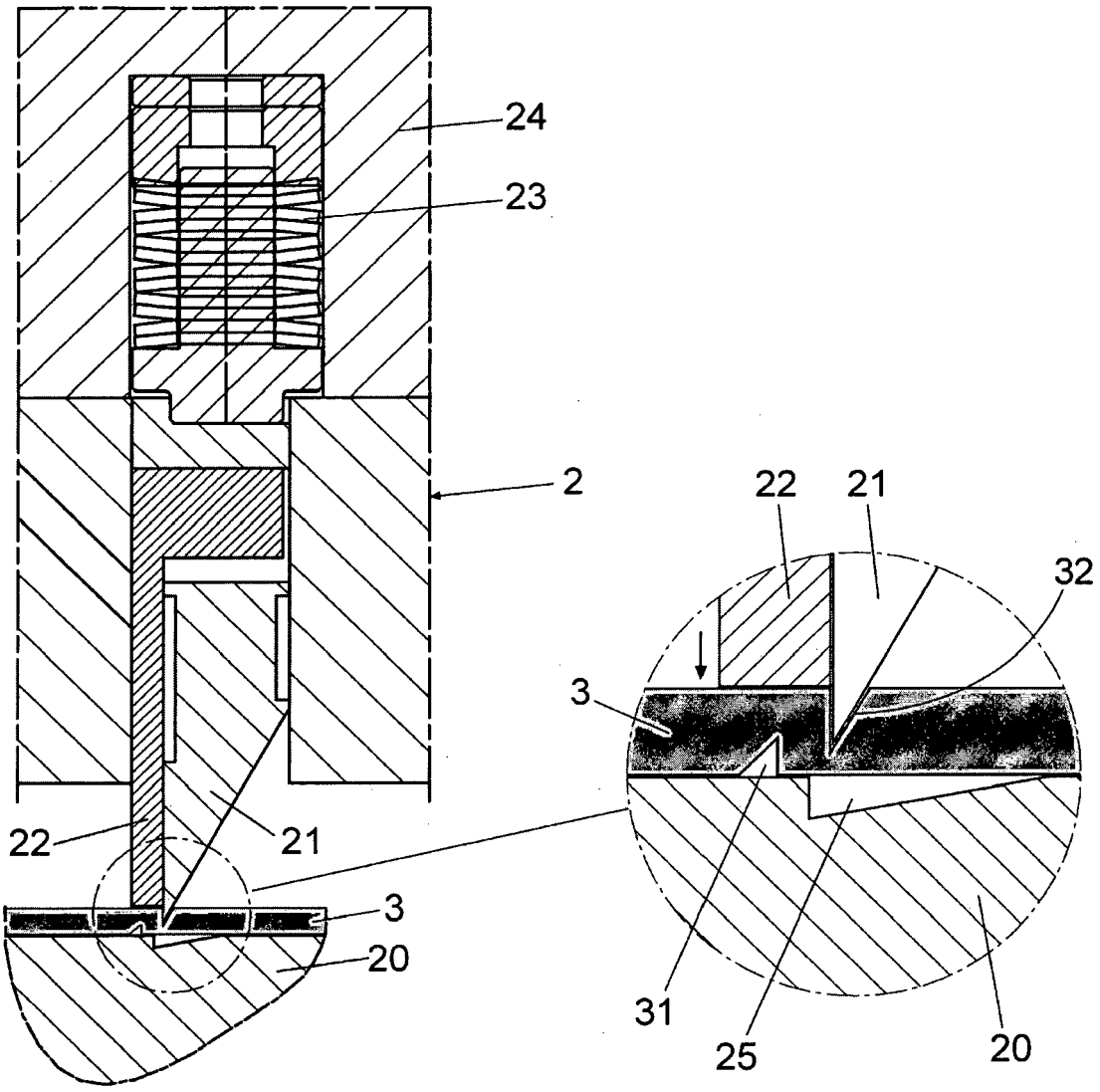

Fig. 4

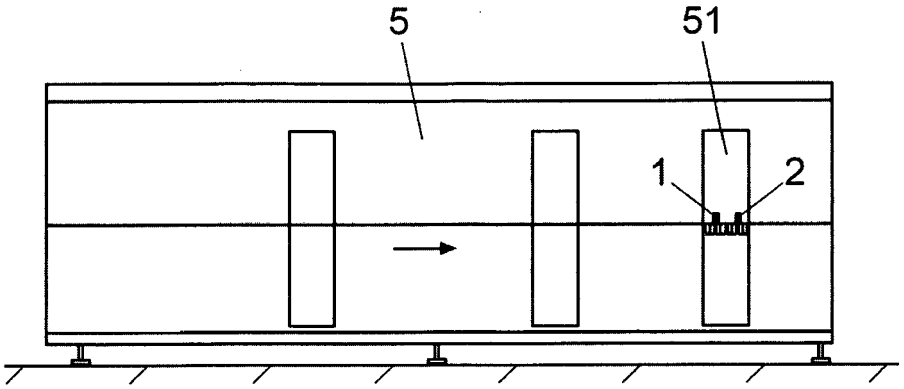

Fig. 5

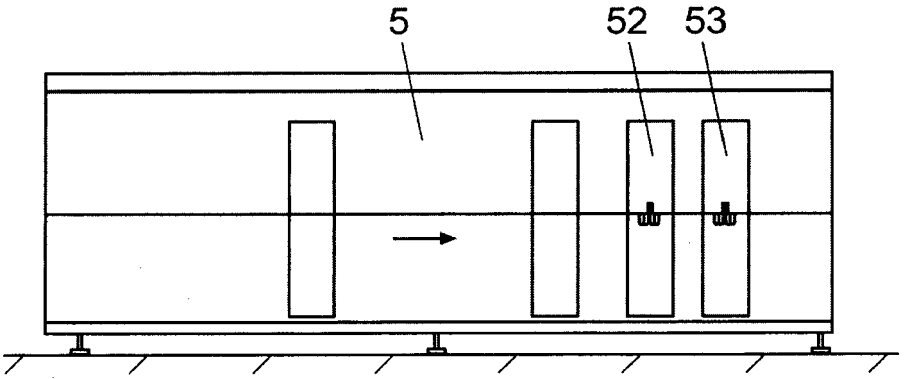

Fig. 6

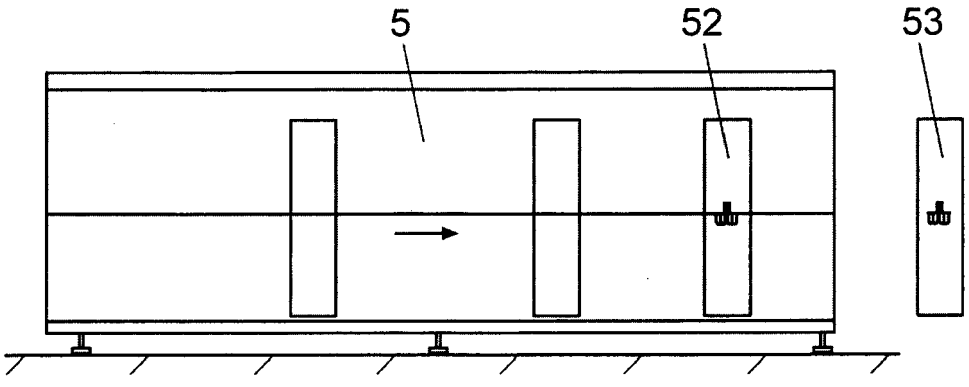

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 19 00 0535

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A	* figures 1,2 *	2	
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B26D
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 March 2020	Wimmer, Martin

CATEGORY OF CITED DOCUMENTS

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